Foreword
Sustainable Mobility: A Paradigm Change
Sirpa Pietikäinen

INTRODUCTION

Global warming is no longer a question of if or when. The models showing its exponential advancement require our immediate attention. We have so far not set our goals or ambitions at a high enough level to limit the temperature rises to the under 2 degrees goal set in the Paris Agreement. The longer we delay the required action, the more expensive it will be.

The need to limit our emissions is acute and radical action has to be taken now, not later. There is no option of delaying this to a later moment: no emergency brake exists that would allow us to stop global emissions from one day to the next or to remove emissions once we reach the projected warming of temperatures.

According to the current rate, it is estimated that we would need the resources of four planets to satisfy our existing level of demand for raw materials by 2050. This puts physical limits to our growth, which are very real.

Transport constitutes about 25 per cent of EU-28 greenhouse gas emissions. In 2015, international aviation experienced an over 100 per cent increase in greenhouse gas emissions over 1990 levels. The emissions of international shipping also increased by over 20 per cent, with road transport emissions increased by about 19 per cent.¹

It is evident, that in order for the EU to reach its goal to reduce its transport emissions by 60 per cent from 1990 levels by 2050, a complete overhaul and paradigm shift is required.

We have no choice but to move forward on an energy transformation, phasing out fossil fuels, and at the same time moving towards a circular economy.

WHY WE ARE WHERE WE ARE

Game theories are very useful in explaining how rules of action affect people’s decision making and choices. Sensible and well-meaning people make choices that affect them and their surroundings negatively, if the incentives and rules are tuned in to support such behaviour. If greediness and short-sighted action are rewarded by the system, at the same time as long-term stability and altruism are repelled, the results will in turn not favour long-term solutions benefiting us all.

The global environmental crisis highlights the crisis of the current way of thinking and acting. The lack of global rules and regulations means that the real costs of human action – the way we produce, transport our produce and consume – are not included in the prices we pay. The profits are enjoyed by few, while the costs and risks are borne collectively by all of us. As Nicholas Stern has proved in his trail-blazing study, the market has failed to incorporate the huge cost of climate change created by the use of fossil fuels.²

THE COST OF FOSSIL FUELS

Europe is nowadays mainly powered by large centralized power plants which use fossil and nuclear fuels. Around 75 per cent of European energy consumption for electricity and heat, transport and certain industrial processes is of fossil fuels. The investment decisions taken are heavily affected by the decisions taken at European level, and so the need for formulating ambitious and binding policies now is apparent. The cheapness of fossil fuels is just an illusion produced by bad policies. Were the real costs of burning fossil fuels included in the price, the price of using these sources of energy would be significantly increased.

The estimated external costs of using fossil fuels are huge. In 2006, the Stern report estimated that the price of continuing on the path of business as usual would lead to costs equivalent to losing at least 5 per cent and up to 20 per cent of global GDP per year. The burden on health care and the adverse effects on human health are significant. For example, according to estimates pub-

lished in *Science* in 2001, fossil fuels are sickening or killing millions in both developing and developed worlds. A report of the World Health Organization (WHO) released in 2016 found that globally around 3 million deaths a year are linked to outdoor air pollution.\(^3\) The vast majority of deaths are due to non-communicable diseases including cardiovascular diseases, stroke, chronic obstructive pulmonary disease and lung cancer. Additionally, acute and chronic illnesses restrict the daily activities of millions of people. In a particularly vulnerable position are women, children and older adults. Evidence indicates that air pollution stemming from transport is an important contributor to the adverse effects of air pollution on human health.\(^4\)

The other costs of fossil fuels are impossible to estimate: it is not easy to put a price tag on the loss of biodiversity, pollution of seas and other ecological degradation. With regard to road transport, apart from the health implications of emissions, there has so far not been a price tag put on the effects of transport activity on noise pollution, landscapes, or biodiversity negatively impacted by distortions or pollution of migration corridors.

**MOVING TO RENEWABLE ENERGY SOURCES**

The economic and technical potential for exploiting renewable energy sources, including in transport, exist. What is lacking at the moment is sufficient political will to help the renewables break even with the conventional sources of power. The disadvantaged position comes from decades of large financial and structural support given to the fossil fuel and nuclear power plants. In Europe, even in 2001, of all subsidies given to energy sectors, over 60 per cent went to fossil fuels or nuclear energy.\(^5\) Globally, 2015 saw a drop in subsidies to fossil fuels; nevertheless, the amount going to subsidize fossil fuels remained more than double that spent on subsidies to renewable energy.\(^6\)

Greenpeace estimates that by switching to renewable energy sources in Europe will mean that by 2050 – with the share of renewables reaching 70 per cent

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\(^4\) Michał Krzyžanowski, Birgit Kuna-Dibbert, Jürgen Schneider (eds), Health Effects of Transport-related Air Pollution (WHO, 2005).


in the electricity sector – the power sector would go down from being the biggest source of European CO₂-emissions to less than 20 per cent. All in all, the potential of powering Europe exclusively from renewable energy sources is established by many prominent studies. According to a study by the German Aerospace centre (DLR), Europe has the economic potential to produce green power well over the current power demand, and also over the estimated electricity demand in the future; the total economic potential amounts to around 145 per cent of the estimated future energy demand.

The economic benefits from turning to renewable energies are enormous. Reducing the dependency on oil with its volatile and continuously rising prices provides the European economy with a stable basis. The positive impact on employment is significant. In 2016, there were 8.3 million jobs in renewables. Estimations expect to see the number of jobs in renewables rise to 24 million by 2030.\textsuperscript{7}

RETHINKING THE SUSTAINABILITY OF TRANSPORTATION

Rethinking the transport system is an integral part of raising energy efficiency, and improving energy conservation and environmentally sustainable production. It is no longer enough to have the ambition of reducing emissions or increasing energy efficiency and better fuel consumption of vehicles. The use of biofuels is not sustainable in the long term: even the aim of electrification does not go far enough. Much more can be done by changing the way people move: more efficient public transport systems, turning city streets biker friendly, faster trains, and hybrid or electric cars are the key areas.

Apart from energy issues, rethinking mobility has to be done in the context of digitalization and robotization. All of these trends are radically changing our societies, how we think about services and consumerism, and how we manage our everyday lives. Many of the directions we need to move in are clear, but responses as to how to get there, and which means to use, are still missing. The role of policy makers will be to provide a favourable environment to the generation of new ideas and to support the needed structural changes.

Sustainable mobility can only be achieved through a fundamental paradigm shift at both local and global levels. We need to develop our thinking around integrated systems. We need to approach mobility as a service. Sustainable

mobility is not separate from logistics. It is about the transfer of people but also the transport of goods. This is central to resource efficiency.

At the local level, the fundamental paradigm shift is needed with respect to urban planning, whereas at the global level, the shift is needed particularly with respect to the transportation of goods.

**MOBILITY AT THE LOCAL LEVEL**

At the local level, an entire overhaul of how we think about urban planning is needed with the aim of ensuring ‘true mobility’.

A starting point should be to facilitate mobility that does not require the individual use of automotive transportation. Essential goods and services will need to be provided closer to people, where even those with limited mobility can reach them. The use of digital technology should be explored to provide services at home as well. In the area of eHealth, for example, there are many examples of this already being used. Mobility, including public transportation, needs to be developed with its different users in mind, whether they are parents with prams or wheelchair users.

At the same time, efficient design of public transportation is crucial for reducing emissions. Public transportation must adopt new electric options rapidly. Many European cities have refurbished tram lines to ensure availability of increased public transportation options with lower emissions. Connectivity needs to be developed to ensure it is seamlessly linked to bike lanes and electric, autonomous cars.

Mobility should be considered a service. Is it really necessary to own a vehicle, or are sufficient services available from which transportation can be ordered in a way that meets an individual’s needs? And thinking of mobility should not be limited to people. A much broader, system-wide consideration of logistics is required. Could the services or required consumer items be delivered instead? Here thinking outside the box should not limit consideration of land transport but also developing technology such as drones.

In all these issues, it should also be taken into account what options and solutions the use and development of ICT and artificial intelligence provide for improved functionality and increased accessibility. True mobility ensures the accessibility of goods and services to everyone equitably. In this sense, accessibility is not just about physical proximity or the availability of physical ramps. In communities developed to be sensitive to Alzheimer’s and dementia patients for example, services have been designed in a way that facilitates their free movement. This means signs that are pictorial instead of written. But it
could further develop into a system whereby the regular transport provider remembers at which stop each passenger lives, knowing to stop there automatically. A passenger with dementia could register where they are going when they get on the transport, in case they forget along the way. The development of smart systems is resource efficient and to the advantage of communities, where people require less constant support and personal facilitation, and where independent activity acts in and of itself as a form of rehabilitation.

With regard to logistics, what systems can be put in place that for example automatically alert and respond to the imminent running out of bulk household items, such as washing detergents, and programme a delivery that coincides with the delivery of the same product to other nearby households?

**MOBILITY AT THE REGIONAL AND GLOBAL LEVELS**

At the global level, the current transportation modalities are outdated and unsustainable. From a sustainability perspective, we need a whole new approach to how goods are made and transported around the globe. The current mess of goods criss-crossing the globe, where raw materials are transported to one side of the globe for processing, then transported back to the other side for consumption, and often transported back again for a third time for demolition or disposal once the products have become waste, is far from resource efficient and not environmentally friendly. So far the environmental impact and costs of these processes have been externalized. They are not counted in the cost of the goods, but we are paying for the cost nevertheless in terms of environmental degradation, emissions and air pollution. But the implications are also evident in terms of challenges in monitoring food origin and safety, not to mention monitoring the origin of resources which may be fuelling conflict or the labour rights of those producing or dismantling these products.

Similarly, at the EU level a close look needs to be taken to review the planning and management of logistics. Our road network or emissions and air pollution levels cannot sustain the current overland trucking of goods. Currently, road freight transport is projected to increase by around 40 per cent by 2030 and by a little over 80 per cent by 2050.\(^8\)

As a first step, a much higher level of ambition is needed to move all possible transportation of goods and people to rail. ICT should be used to optimize logistics, for example to ensure that all cargo containers are full when in

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transport. The initiatives to make shipping emissions free or run trains on solar power are inspiring and valuable steps in the right direction that need urgent scaling up.

At the EU level, we also need to start thinking about mobility through a concept of integrated systems. The same way as we plan our electricity networks to run and deliver energy across borders, or determine how EU citizens can access health care services across borders, we need to build integrated mobility systems across Europe. This will enhance the working of the internal market and free movement of goods and services. But it should also be done to ensure that the most efficient, cost-effective systems are developed, with interoperability.

CONCLUDING REMARKS

Climate change is moving on faster than anybody could have estimated. Europe and the rest of the world have no other chance than to revolutionize the way we produce, consume and live. The technical possibilities for this revolution exist, and many studies prove that early action transforms into economic benefits. In contrast, the longer we wait, the more the change and adaptation will cost, amounting to enormous sums. The old rules rewarding short-sighted, self-serving action over the benefit of the whole of mankind must be reversed as soon as possible by determined political action.

Europe stands at a crossroads where it has the chance to invest in the future by turning to more sustainable production and consumption patterns through resource efficiency and reducing energy consumption. The alternative is to cling to the current disruptive patterns and unsustainable ways. The huge costs of the second option can already be seen, and there is no question that these costs will become unbearable if we do not to change the whole system.